

(54) FURFURYL ALCOHOL RESIN

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(45) Issued on: **Dec. 8 , 1942**
(22) Filed on:
(43) Laid open on:
(52) Canadian Class (CPC): **400/1401**
(51) International Class (IPC): **N/A**

00220

S P E C I F I C A T I O N

BE IT KNOWN that John G. Meiler, whose address is 1308 $\frac{1}{2}$ Grand Avenue, City of Wausau, County of Marathon, State of Wisconsin, United States of America, whose occupation is Research Chemist, having made an invention entitled

FURFURYL ALCOHOL RESINS

the following is a full, clear and exact disclosure of the nature of the said invention and of the best mode of realizing the advantages thereof.

This invention relates to the formation of resinous products from furfuryl alcohol and lignin-sulphonic acid compounds.

I have found that by mixing furfuryl alcohol and various lignin-sulphonic acid compounds a resinification occurs producing new and useful products. The rate of this resinification can be controlled by the amount and type of lignin-sulphonic acid compounds used, the temperature of mixture, and the absence or presence of suitable solvents.

The lignin-sulphonic acid compounds which are suitable for the purpose of this invention can be derived from waste sulphite liquor in various ways. It is preferred to use as the raw material the basic precipitate produced according to the Howard process disclosed in Reissue Patent No. 18,268, December 1, 1931. Suitable lignin-sulphonic acid compounds produced from the basic precipitate of the Howard process are disclosed in the following series of patents.

Canadian Patent No. 353,886, November 5, 1935 to Guy C. Howard, discloses a method of making an aqueous dispersion of lignin-sulphonic acid and the production of a solid product

from this dispersion. These two products (1) the aqueous dispersion of lignin-sulphonic acid and (2) the solid produced therefrom are also suitable lignin-sulphonic acids for the purpose of this invention.

The precipitated lignin derivative disclosed in Canadian Patent No. 370,880, December 28, 1937, to Sandborn, Salvesen and Howard, which is a sodium salt of a partially desulphonated ligno-sulphonic acid and the corresponding calcium and sodium salts disclosed in Canadian Patent No. 370,716, December 21, 1937 to Howard and Sandborn are also suitable lignin-sulphonic acid compounds.

The lignin-sulphonic acid compounds derived by the process of Canadian Patent No. 370,716, December 21, 1937, as well as the similar derivatives in Canadian Patent No. 370,880, December 28, 1937 and 329,751, January 31, 1933 when leached with strong inorganic acids, e.g. HCl, produce partially desulphonated lignin-sulphonic acids which are also suitable. These patents disclose lignin-sulphonic acid compounds and describe various modifications of the processes disclosed therein which will also produce lignin-sulphonic acid compounds suitable for this invention in which one or more of these various modifications of lignin-sulphonic acid compounds may be used with furfuryl alcohol. It is to be understood that lignin-sulphonic acid compounds obtained from whole waste sulphite liquor processed in accordance with the aforementioned patents are also suitable for the purposes of this invention.

The following is an example of an embodiment of the invention:

	<u>Parts by Weight</u>
Furfuryl Alcohol	100
Partially desulphonated lignin-sulphonic acids	20

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The ingredients in the proportions given are heated with agitation for a period of about 24 minutes in a temperature range beginning at about 40°C. and ending at about 65°C. The viscous mass is then cooled to room temperature or lower for use. It is black in color and when heated gives a hard black shiny resin. The viscous resin produced in the above example can be dissolved immediately in a suitable solvent such as methyl, ethyl, or butyl alcohol, acetone, dioxane, Cyclonol, (a cyclic acetal sold by E. I. duPont de Nemours & Company) water and the like, or it can be coated directly while in viscous condition on a sheet of paper to produce a moldable sheet.

It is to be understood that the proportions given in the above example can be varied over wide ranges. Satisfactory products have been produced using up to about 50% by weight of each of the ingredients depending upon the properties of the product desired. The aqueous lignin-sulphonic acids and the dried products from the dispersion, or the various lignin-sulphonic acid salts previously described can be substituted for the specific lignin compound given in the above example. However, in order to obtain satisfactory results, suitable changes in the heating conditions and time will have to be made depending on the amount and type of the various ligno-sulphonic acid compounds used. As previously stated, the rate of resinification can be increased by increasing the amount and type of lignin-sulphonic acid compounds used, the temperature of the mixture, and the absence or presence of suitable solvents.

What I do claim as my invention, and desire to secure by letters patent, is -

1. A resin produced by reacting furfuryl alcohol and a substance selected from the group consisting of lignin-sulphonic acids and salts thereof.

2. A resin produced by reacting furfuryl alcohol and a salt of partially desulphonated lignin-sulphonic acid.

3. A resin produced by reacting furfuryl alcohol and a partially desulphonated lignin-sulphonic acid.

4. A resin produced by reacting substantially 100 parts by weight of furfuryl alcohol and substantially 20 parts by weight of a partially desulphonated lignin-sulphonic acid.

5. A resin produced by reacting substantially 100 parts by weight of furfuryl alcohol and substantially 20 parts by weight of a substance selected from the group consisting of lignin-sulphonic acids and salts thereof.

6. A resin produced by reacting furfuryl alcohol and a substance selected from the group consisting of lignin-sulphonic acids and salts thereof in substantially equal parts by weight.

7. The process of making a resinous material which comprises heating furfuryl alcohol and a substance selected from the group consisting of lignin-sulphonic acids and salts thereof at a suitable temperature for a sufficient time to produce a viscous resinous mass and cooling said mass.

8. The process of making a resinous material which comprises heating about 100 parts by weight of furfuryl alcohol and about 20 parts by weight of a substance selected from the group consisting of lignin-sulphonic acids and salts thereof from about 40°C. to 65°C. for a sufficient period of time to produce a viscous mass, and cooling said mass.

SUBSTITUTE
REMPLACEMENT

SECTION is not Present
Cette Section est Absente